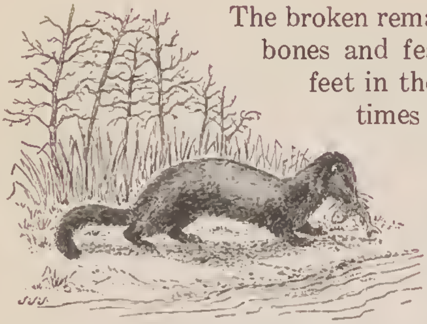
FIELD MUSEUM STORIES

The Mink
An Important Fur-Bearer

Series XXXIX, No. 1
October 3, 1942
Looseleaf No. 63



The mink with its prey

The broken remains of crayfish, a tangle of bird bones and feathers, or prints left by small feet in the soft mud or snow, are sometimes signs that there a mink passed by not too long ago. In woods and fields it stalks rabbits, birds, and mice that harass the farmer, or it occasionally removes a chicken from the hen-house. By the water's edge it hunts frogs, crayfish, turtle eggs, and small clams. When a fish glides near, large or small, the mink slips in after it and, swimming completely under water, usually makes a successful catch. Muskrats, especially, are sought by the mink, and it may spend hours at a time running along the river course, briefly investigating this muskrat hole, then out and on to that one. If an owner is at last found at home, the mink seizes it, often on the under side of the throat, bites through the blood vessels with needle-sharp teeth, and settles down for a meal.

Eventually it will have cleared one area of small animals, and then the mink moves on to new hunting grounds. It seems to cover a good deal of territory in its travels, and perhaps from time to time during its life will have gone over fairly thoroughly as much as a five-mile square. In several parts of this range the mink locates its dens—hollow trees, holes hidden under rocks, stumps, bridges, or snarls of tree roots. Around Chicago it often lives in the network of tiles on tile-drained farmlands. Sometimes the deserted tunnels of skunks, muskrats, or badgers are taken over, at other times the mink makes its own burrow. If, in a suitable place, the earth is easy to dig, it scratches a hole some four inches wide and gradually slopes and lengthens it until it stretches along ten or twelve feet. Probably the mink does not use only the one home all its life long, but lives in whichever is convenient to its particular hunting preserves of the moment.

As well as being the place for sleep and a hideout from enemies, the den is likewise the scene for something else. In the more or less rounded room, almost a foot across, which makes up the end of its burrow, or in an abandoned muskrat house, the female, without any help from the male, packs bits of dried grass, moss, and feathers. Some time toward the last half of April the three to ten young minks, each the size of a piece of chalk, blind, and usually hairless, are born in the midst of this mass of bedding. Near the middle of August, the young, though only half grown, leave their mother, and go off to live alone. The females are entirely grown by the end of their first year, but it takes the males another six months to equal them. Except at the breeding season, minks are not sociable animals and during most of their life will quickly attack with teeth and claws another of their kind that tries to hunt in the same territory.

Although mink in zoos or fur farms may live to be eight or ten years old, the life of the wild ones is probably not long. Some of their larger meat-eating enemies have been considerably killed off by man, but there are yet foxes and large owls that catch small animals when they can. Man, however, is the greatest enemy of all, for armed with traps and guns, and spurred on by the prospect of several dollars for each skin, he takes a toll of several hundreds of thousands of wild mink a year throughout the United States, some thirty to forty thousand in Illinois alone. The mink's misfortune is to be covered with soft, glossy, well-wearing fur, so that mink are most familiar in the form of mink coats; it may take as many as sixty-five or more skins to make one coat. The fur is in its prime, is thickest and best, from November to the end of the winter months, and at that time the mink are hard hunted throughout their range—the wooded and well-watered parts of most of Canada and the United States. In spite of the death constantly at its heels, the mink nevertheless is still a rather common animal—one that may be seen even within the borders of towns and villages.

It is not difficult to recognize the mink; it is a weasel, a large one, almost two feet long. Unlike some of its smaller relatives, however, the mink does not turn white in winter, but keeps the brown in its coat and bushy tail all the year round. Like the other weasels it too has an unsuspected way of defending itself, for it can send out from two glands under the tail small dribbles of a most unpleasant-smelling liquid. A few whiffs of this are often enough to discourage those who would rather handle the mink than watch it.

ELIZABETH BEST
Raymond Foundation

NOTE: The mink and its relatives can be seen in Hall 15.

This page is for your own notes and illustrations

FIELD MUSEUM STORIES

Web Spinner
The Orange Garden Spider

Series XXXIX, No. 2
October 10, 1942

Looseleaf No. 64

WEB SPINNER: THE ORANGE GARDEN SPIDER

The orange garden spider in its web

The orange garden spider is handsome and striking in appearance. The front part of its two-piece body is black and hard, but the silver-white hairs which cover it give it a soft and furry appearance. The plump, rather globular hind section of the body is broadly striped with black and yellow on both top and under sides. The eight legs, long and slender, are black, but each, except the first two, is brightened by one red joint near the body. In the summer time the full-grown female is almost one inch long in body, but the male measures scarcely one-fourth her size and has only the fuzzy outlines of her distinct color pattern.

Some spiders stalk or lie in wait to pounce upon their prey, but not so the orange garden spider. Like a fisherman it sets out its net and then waits quietly for what may enter. The wheel-like web or orb is stretched amongst tall grasses in a meadow, or between flowers in a garden border, and hung high enough above the ground to be in the path of flight of some oncoming insect. The strands that go to make up this trap are spun of silk from the under side of the very end of the abdomen, or hind part of the spider body. Located there are three pairs of small pencil-like projections—the spinnerets—and on each of these are scattered the many minute tubes which, leading from the silk-making glands inside the abdomen, spew out the threads of silk.

The spider, about to make its web, lays the foundations in some fairly open place skirted by plant supports. If the further side of the future web is several feet away, the spider, balanced on some grass or leaf, hoists high the end of its body and lets forth a stream of silk. Eventually a gust of wind plucks up the delicate thread and sweeps it against a nearby stem. There then hangs the first beam of the web—one end with the spider, the other fast entangled a distance away. When the other lines of the scaffolding have been strung about the first, the spider begins work on the central part of the web. It passes a thread through the center of the space which the finished web will fill, attaches it well at both ends, and then travels back over it. Midway the spider stops, touches a spinneret to the thread and makes, off at an angle, a new line. By constantly going back and forth from the center to different points on the side, it finally engineers a large and rimless wheel, perhaps two feet in width.

Clambering back to the hub of the web, the spider drops threads there back and forth criss-cross and over, until a coin-shaped mat is laid down. Then comes the spiral line. The spider works from the center to lay down a continuous slender rope which, coiling widely outward, crosses over the spokes and holds them all in place. Most of this is temporary and when it is done the spider goes to the outside of the web and starts another, permanent spiral that circles like a whirlpool toward the center. Unlike all the other threads, which were quite dry, this last is strung with small globules of sticky silk that will hold fast whatever insect runs afoul them. Spinning slowly centerward, the weaver nips off and discards the lines of the first, non-sticky spiral as it comes to them, but leaves a few rounds near the center. Often, at the last, it adds a heavy zigzag band across the center, either as strengthening for the web or as a disguise for its maker.

The web is done, perhaps within an hour, and on its under surface at the hub, the spider hangs head downward, motionless and waiting. A beetle or a fly eventually may blunder in amongst the spokes and spirals and as it kicks and struggles the spider edges near, bites it, and wraps it in a winding sheet of threads freshly spun for the purpose. When the meal is over, the remains are thrown away, and the shattered web is repaired. Although the bite of the garden spider is no more painful to man than the wound left by a mosquito, it is deadly to many of man's enemies —grasshoppers, flies, harmful moths, and other insects.

Late in summer, around September, the female, then large and plump, lays some hundreds of small eggs and encloses them all together within a silken, parchment-like sac which she fastens to a drying plant stem. Though the young spiders burst out of the egg shells within a month, they spend the winter inside the egg bag, and emerge into the outside world the following spring. The life of the garden spider is probably not more than a year, so that it has but a few short months in which to weave and spin.

Elizabeth Best
Raymond Foundation

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FIELD MUSEUM STORIES

Kangaroo Life

Series XXXIX, No. 3
October 17, 1942
Looseleaf No. 65

KANGAROO LIFE

Kangaroo with young

For most of the day there lie sprawled at ease in the shade of a bush or tree some of the largest of Australian natives, the kangaroos. Those of one kind have bodies as long as five and a half feet, others are shorter, perhaps not quite four; while still others, sometimes called wallabies, are much smaller. Some kinds live along rocky hillsides, some on open plains, and others in thickets and forests. Some kinds have reddish coats, others are colored gray or brown. But whatever their size, color, or home, most kangaroos are much alike in habits. The coolness of late afternoon wakes them from their dozing and with its new sounds and smells sets atwitch the ears and nose of one kangaroo after another. By twilight most of the resting groups, little ones of five animals or big ones of over fifty, have started on their way to the feeding grounds to browse on grasses, shoots and buds on shrubs, or corn and wheat in a nearby farm. In the early morning hours they troop back again to find shelter from the heat of the sun.

Although the youngest also travel with the older ones back and forth to the feeding grounds, they go unseen, carried invisibly on the body of the mother. The young kangaroo, born in a very undeveloped state, looks more like an inch-long, red and squirming kidney-bean than like either of its parents. Almost immediately after birth, it starts blindly plowing its way up through the fur on the under-side of its mother's body. There, usually within half an hour, unaided by the female, it has reached the mouth of the pouch, a dark and roomy bag but a few inches from where it started the journey. Once inside, it clamps its lips over the milk-source, a nipple, which softens and swells inside the young one's mouth, holding the small animal firmly in place. For almost four months the young kangaroo lies warm and hidden, fastened to the nipple. At the end of that time it has grown a coat of fur, has developed the pear-shaped body and horse-like face of the adult, and is about ready to peer out at the world from the safety of the pouch. Soon it spends more and more time entirely outside these now cramped quarters, but until it is too large to squeeze within, it still jumps for that shelter when something startling comes near.

Jumping is the chief way in which kangaroos get about and during each leap both tail and legs are almost equally important. The tremendously enlarged, rabbitty-looking hind legs are the levers that shoot the animal ahead, but the long and powerful tail, although it does not touch the ground, is the balance that prevents the body from falling flat. Leaning slightly forward as it goes, the kangaroo covers four or five feet in an ordinary slow-motion hop, but when speeding across a flat plain at perhaps twenty miles an hour, it sails twelve or more feet at a bound. The old males, heavier in body than the females and young animals; can not equal the pace of the others and so bring up the rear of a group on the move.

The hind legs carry the animals about and protect them as well. The toes are fashioned in a rather peculiar way: the first two are short and slender, and are joined together like a pronged claw by a fold of skin; the next toe is very large and tipped with a powerful, long-pointed claw; the fourth is like the one before it, but is a great deal smaller. On occasion, a kangaroo, pursued by dogs or hunters until it can run no more, will back against a tree and rip and slash at whatever comes within reach of the knifelike nail on each hind foot. Sometimes, too, the males, in play or anger, will spar with each other, using the fore-paws or else, by leaning heavily back on the tail for support, the hind ones.

Before the time of the white men's settlements in Australia the kangaroos were plentiful. Their only enemies then were dingoes, wedge-tailed eagles, and the native Australian dark-skinned people; but now white men and the dogs and foxes which they have brought with them, have lessened the kangaroo numbers. They still live in many parts of Australia, sometimes as close to man as along the outskirts of his towns.

ELIZABETH BEST
Raymond Foundation

NOTE: Several kinds of kangaroos can be seen in Hall 15.

This page is for your own notes and illustrations

FIELD MUSEUM STORIES

Silver and Turquoise

A Story of Navajo Jewelry

Series XXXIX, No. 4
October 24, 1942

Looseleaf No. 66

SILVER AND TURQUOISE: *A Story of Navajo Jewelry*

Navajo bowguard

A Navajo Indian silversmith sat in the shade of a gnarled juniper tree, fashioning a bowguard for his son. He had bought silver and a fine piece of sky blue turquoise from the white man at the trader's store. For many days he had thought about the shape and design of the "gato."

With his chisel and awl the smith carved the design in a flat piece of sandstone. He took another flat piece and made a hole in the middle of it, and, after greasing the stones with some mutton fat, tied them firmly together.

He melted the silver in an old tomato can over a hot fire of juniper charcoal and, grasping the edge of the can with a pair of tongs, slowly poured the liquid into the hole at the top of the mold. After several hours, when the metal had hardened, he carefully separated the two stones and lifted out the bowguard. The work was well done. Now he had only to file the rough edges and polish the silver to satiny smoothness with sand and ashes. With a tiny strip of silver he fastened the turquoise in the center of the bowguard. The Indian smiled. His son would be proud to wear such a fine gato when he went rabbit hunting on the desert. The boy would wear it on his left wrist, strapped on with a piece of leather, so that when he shot an arrow from his bow the bowstring would twang against the hard metal and not cut his arm.

The man's own bowguard was worn thin from many years of use but it still gleamed against his brown skin. He had watched his father make it long ago, and he had learned how to use the tools and work the silver.

He had made beautiful bracelets and rings and earrings for his wife and children and for himself, and little flat buttons to decorate the bright-colored velveteen shirts that they wore. He had also made belts with round flat pieces of silver, called "conchas," fastened to them, and fine necklaces of hollow round beads with a crescent-shaped pendant, the "naja," hanging from the bottom. Between the beads hung silver ornaments shaped like tiny flowers.

He did not often cast the silver in molds as he had done in making the bowguard. Usually he hammered the soft metal into the shapes he wanted and carved or stamped designs on them. In some of the jewelry he set pieces of turquoise. Turquoise was a sacred stone and every Navajo wore a piece for protection from evil. Their ancestors had made necklaces and earrings and other ornaments from turquoise hundreds of years ago.

The man's grandfather used to tell him stories of the time when the Navajos did not wear silver jewelry. That was before the year 1850 when Atsidi sani, "The Old Smith," had learned how to forge iron and silver from a Mexican metalworker. After he had mastered the craft he had taught others.

Many Mexican people lived in the southwestern United States at that time and the Navajos copied the silver ornaments that the Mexicans wore, the buttons and tiny ornaments shaped like pomegranate fruits worn on the outsides of the trouser legs, and the flashing bridles on the horses. The Navajos did not wear trousers, so they strung the buttons and pomegranate fruits on strings and wore them as necklaces.

From their neighbors the Plains Indians, who lived on the grasslands farther east, the Navajos got bracelets and rings and belts made of silver, copper, or brass. The Plains Indians did not know how to make these things themselves, but got them from the American traders in exchange for furs. The white men knew that the Indians liked these shiny ornaments, and in the big cities of the eastern United States there were metalworkers who made them especially for trade with the Indians. At first the Navajo silversmiths copied the white man's jewelry, but soon they began to create their own shapes and designs.

Besides being lovely ornaments the jewelry was useful as money. In fact, most of the early pieces were made from Mexican and American silver dollars, melted or hammered into the desired shapes. The traders would accept a ring or a bracelet in exchange for food. And if sometime later a Navajo wanted his ring back, he would bring a sheep or a fine blanket woven by his wife and exchange it for his piece of jewelry. Even nowadays the Navajos pawn their jewelry this way when they are poor and buy it back when they can afford to.

Elizabeth McM. Hambleton
Raymond Foundation

NOTE: There are fine examples of old Navajo jewelry in Hall 6, and some pieces of modern jewelry in the case called "Indians in the Americas" on the east side of Stanley Field Hall.

FIELD MUSEUM STORIES

Tin a Valuable Metal

Series XXXIX, No. 5
October 31, 1942

Looseleaf No. 67

TIN A VALUABLE METAL

Mining tin in Malaya

Few metals have been used by man as long as tin. It possesses many valuable properties. It does not corrode or tarnish easily and so it is used to coat iron, steel, and copper, all of which are liable to rust. Tin can be rolled into a very thin sheet to make tinfoil for collapsible tubes. Combinations of tin with other metals results in such useful alloys as bronze, pewter and babbit metal. Because tin melts at a low temperature it can be used in the manufacture of solder.

Early man prized tin highly because by combining it with copper he could make bronze, an alloy, harder and of better quality for tools than either of the two soft minerals copper and tin. It was after man had mastered the art of using copper and bronze that he left the stone age behind and advanced into the age of metals.

In 3300 B.C. Egyptians first made objects of almost pure copper but shortly thereafter learned to use bronze; in Europe also tin was used about 2000 B.C. The earliest source of European minerals was the tin-copper mines of Saxony. First the Phoenicians and later the Romans used tin from the mines of Cornwall in western Great Britain. Increasing amounts of tin ore were used when pewter, another alloy (tin and lead), came into common use. By 1348 English crafts of miners and pewterers dominated the tin trade. It is to the tin miners of Cornwall and Saxony that we owe the beginnings of mining and until the eighteenth century the Cornish mines provided most of the tin ore used, but with the appearance of Netherlands East Indian ore on the market, the tin mines of Cornwall became relatively unimportant. England continued to dominate the tin market, however, for until recently most tin-processing mills were located there.

Experiments were begun on preserving foods in containers as far back as Napoleon's time. His armies needed fresh foods while campaigning, and something had to be devised to meet their needs. By 1825 tin cans were in use. Enormous supplies of the metal are needed to produce the cans used to protect food preserved in our country and sent abroad, so more than 60 per cent of the world's supply of tin comes into the United States to be made into tin cans. Other important uses are for printing type, tin salts used in setting dyes, roofing, mirror backs, spouts, buckets, cups, pans, tin foil and tubes for toothpaste, paints and creams.

But the mineral that meets the need for an inexpensive metal container has been deposited in comparatively few regions of the world. Our supplies all come from far-away lands that are now under the control of an enemy power. Although the Bolivian deposits are relatively near, these mines have not been developed to any great extent and the present shortage of ships makes the transportation of Bolivian ore very difficult. Tin has no considerable military use except for food-packing.

Deposits in Malaya, foremost tin-producing region, are found in river beds; sometimes they extend ten miles along the stream course. There is usually a rich layer of tin ore concentrated a few feet under the surface gravel. Formerly this gravel was removed by natives, who used pans to scoop it up and wash it. The heavier tin remained on the bottom of the pan while the lighter waste was washed out. Today overlying rocks are washed off by powerful jets of water.

The Netherlands government owns the tin mines in the Dutch East Indies and modern mining methods have made this another important tin-producing region. Three small islands—Banka, Billeton and Singkep—along the east coast of Sumatra produce a high grade ore. Near Singkep, the deposits lie at the bottom of the sea and great mechanical buckets dredge the sea floor.

Bolivian ore comes from mines far up in the Andes Mountains and was not exploited until recently because of the difficulties in transportation over the steep mountain passes. Bolivian ore is difficult to smelt by older methods but recent improvements have revolutionized tin refining. We now have a smelter in Texas to handle South American ore.

Although negligible amounts are found in a few of the states the only tin mined to any extent in North America is in Alaska, where it was first uncovered as an objectionable constituent of gold. The Federated Malay States, Bolivia, Netherlands East Indies, Thailand, China and Nigeria are the chief tin-mining regions.

MARIE B. PABST
Raymond Foundation

NOTE: Exhibits in Halls 34 and 37 show samples of tin ore.

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FIELD MUSEUM STORIES

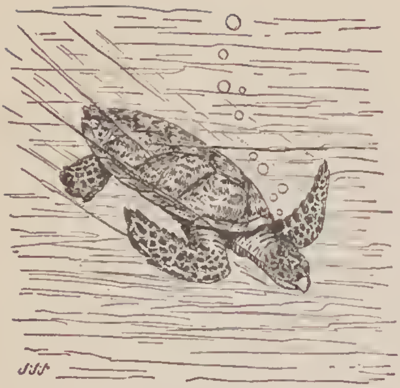
The Sea Turtles

FIELD MUSEUM of NATURAL HISTORY
FOUNDED BY MARSHALL FIELD 1893
CHICAGO

Series XXXIX, No. 6
November 7, 1942

Looseleaf No. 68

THE SEA TURTLES



A sea turtle

Found the world round in the warm parts of tropical and subtropical oceans are the sea turtles. Occasionally a wanderer swims as far north as Cape Cod or Long Island, and then the sight of the giant animal coming up for air or floating asleep in the water causes the greatest excitement and fever of hunting amongst the local fishermen. Its stay there is not often long—either exchanged for a return trip south or cut short by a harpoon.

The ancestors of the sea turtles entered the ocean from the land, like various other groups of sea-dwelling reptiles. It is easy enough to see why, once adapted to life in the water, they continued to live there. The heavy body, sometimes almost a thousand pounds of it, is moved about by broad oar-shaped legs or flippers. On land, sea turtle locomotion is a slow, laborious, and exhausting job, but in the water the great weight is considerably supported by the water itself, while a few powerful sweeps of the paddles send the body shooting ahead, back, down, or up. In an adult, the head, about the size and shape of a large grapefruit, is armed with horny but toothless jaws, strong enough to crush conch shells or oysters, so that, combined with the massive body, it helps give the sea turtle a substantial and ponderous air.

There are several kinds of sea turtles, all hunted for the sake of the money their flesh, eggs, or shells can fetch in the market. One of the best known is the green turtle, so-called from the color of its fat. Great numbers of them, many with shells over four feet long, were caught in the past along the coasts of Florida and the West Indies, but now far fewer and smaller ones are found there. The sea turtle that is most often come upon along the coasts of our eastern states, and the one that seems to breed the farthest north, is the loggerhead. Its flesh, fortunately for its life-span, is not so finely grained and palatable as that of the green turtle, and therefore this large-headed animal is not as eagerly pursued. The hawksbill is valued for the smooth, soft-colored, horny shields, or tortoiseshell, that covers its back.

This, used in the making of little boxes, combs, and various ornaments, has been collected for so long that now the turtle is rare in every region. The young hawksbill is easily recognized by the shingle-like arrangement of the shields on its back, and the parrot hook of its upper jaw, but as it becomes older both of these trade-marks are somewhat worn down. Largest of all sea turtles is the leatherback. Instead of the plated head and flippers of the others, or their horny, plated backs, it has smooth head and legs, and a sturdy, leathery skin-covering on its top-side. Though used for food, most of the flesh and fat of the leatherback goes into oils and varnishes, while its eggs, like those of the other turtles, are eaten as a delicacy.

During one season of the year, usually April to August in the Gulf of Mexico region, earlier or later in other parts of the world, many of the female sea turtles come on land to lay their eggs. The turtle flounders out of the water, up the sandy beach, and usually stops at a spot beyond reach of the tides. There by sashaying from side to side with her body and sweeping the sand away with her fore-flippers, the female digs a shallow trench. Then, without turning her head to watch the operations, and working only by touch, she hollows out with scoops of one hind flipper and then the other, a bulb-shaped nest, almost two feet deep. Sliding the body very slightly into the finished hole, she lays perhaps a hundred white-shelled, spherical eggs. That accomplished, she sprinkles a few flipperfuls of sand over them and roughly fills up the remaining cavity with more sand. As a last work, she scatters sand far and wide with her flippers, stirs up the area about the nest, thoroughly hiding it, and, turning about, makes for the water. She may come back to land several more times that season to lay eggs in other nests, but never returns to watch over any of them.

Unless the nest is robbed by man or other animals, the young hatch out in about eight or nine weeks and go directly to the water. Their early life is far from tranquil, for preyed upon by giant land-crabs, birds, and fishes, perhaps far less than half will ever become adult. They, in their turn, however, as they increase in age, feed on fish, small crabs, mollusks, algae and other water plants, and may live twenty or even many more years.

Elizabeth Best
Raymond Foundation

Note: A green turtle, a hawksbill and a loggerhead can be seen in Hall 18.

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FIELD MUSEUM STORIES

Guano

Series XXXIX, No. 7
November 14, 1942

Looseleaf No. 69

GUANO

Guano-producing birds

Off the coast of Peru is a group of islands too small to be indicated on most maps but known throughout the world because of their abundant bird life and the wealth they have brought to Peru. Each year, from November to March, multitudes of marine birds nest on the rocky ledges and flat tops of these islands. The accumulated droppings have covered the land with a white deposit called guano. The word guano is taken from the Indian word "guanay," the name for the birds.

The birds nest on these islands and the guano accumulates due to peculiar circumstances. Through the South Pacific flows an ocean current which begins near the South Pole and travels northeast toward the equator. Its cold waters are augmented by upwelling water from the ocean depths. Like a huge river of cold water it flows through the warmer ocean. The cold winds that blow inland across the current make a desert of western Peru. As many as seventeen years have passed without rainfall along the arid Peruvian coast. In the current lives such an abundance of plant and animal life that it forms one of the wonders of natural history. Named after the man who explored so much of South America, the Humboldt Current has attracted many naturalists.

Because of the richness of life in the Humboldt Current many birds, including the three most important in guano production—the brown pelican, gannet, and cormorant—nest on the islands off the shores of Peru. Early in November the birds fly in to the islands. Their wheeling flocks darken the sky as thousands return to the nesting grounds. Constructing their nests on the shelving rocks the birds make use of every bit of space. There is an average of four birds to a nest and they all feed on the fish found in the Current. After they have gone there is a glittering white coating over their nesting sites. The refuse left by the birds amounts to between 200,000 and 300,000 tons annually. As much as ten tons of guano has been removed from the roof of a low shed, as a result of two months' occupancy by the birds.

The nitrogen and phosphorus of the waste deposit, which would be lost in a humid climate, have been preserved and stored in the rocks of the rainless region for hundreds of years. Had the climate been moist the valuable nitrogenous part of the guano would have been lost by evaporation or drainage.

Nitrogen and phosphorus are two elements essential for plant and animal life. Plants secure their supply from the soil and animals obtain nitrogen and phosphorus from their food. If farmers are to have bountiful harvests they must frequently replenish the nitrogen and phosphorus in their fields.

Before the days of Pizarro, Spanish conqueror of Peru, Inca Indians used guano as a fertilizer and although annual visits were made to the Guano Islands to collect the fertilizer each spring, rigorous laws protected the guano-producing birds.

Farmers use many fertilizers to enrich the soil; potash, crushed lime, manure, ashes of seaweeds, but the most effective known seems to be the droppings from the birds of the Humboldt Current. During the nineteenth century vessels from Europe and the United States docked regularly at the bird islands for cargoes. The price received in North America for bags of guano was so profitable that fortunes were built on the importation of the commodity. It was inexpensive to secure because the only cost was that of transportation and in some years over 100,000 tons were exported. Each shipload was taxed and the Peruvian government grew wealthy.

For many years guano was being taken from Peru where it was needed most. A cheap fertilizer is almost a necessity to the Peruvian farmers, who are handicapped by the expense of irrigation and crude methods employed by inefficient labor. In fact, so much guano was removed that the birds were disturbed and looked for other nesting sites. It seemed the Peruvians were killing the "goose that laid the golden egg." The government of Peru finally had to hire biologists to control the export of this valuable product and prescribe the season for its removal. By a system of rotation these biologists have made breeding grounds available for the birds and the future supply of guano now seems assured.

MARIE B. PABST
Raymond Foundation

NOTE: In Hall 36 there is an exhibit showing the use and production of nitrates and in Hall 21 are the guano-producing birds.

This page is for your own notes and illustrations

FIELD MUSEUM STORIES

Wood Oil from China

Series XXXIX, No. 8
November 21, 1942

Looseleaf No. 70

WOOD OIL FROM CHINA

Leaves and fruit of tung oil tree

Of the many foreign plants introduced into this country perhaps none is more valuable than the tung oil tree. It is almost indispensable in making paints, varnishes and enamels, and it can, in some instances, be used as a substitute for rubber.

For over five thousand years the Chinese have used the oil from the nuts of a wild tree growing along the Yangtse River in central and western China. The tree is known by several names. The Chinese name, "tung," meaning "heart," comes from the form of the leaves, which are heart-shaped, like those of our common catalpa. The flowers, which appear before the leaves, are white with pink centers and the blossom-covered trees are an attractive sight in the early spring. The fruit looks like a small green apple. Inside are three to seven large brown seeds that are inedible and even poisonous, but they contain the highly prized oil.

In the United States these are gathered in the autumn after the fruit has fallen. In China the green fruit is knocked from the trees, collected and allowed to ferment until the husk can be easily removed. Using green fruit is injurious to the quality of the oil. Then the kernels are removed from the fruit and the oil is squeezed out, the work being done by crude and laborious methods. In 1935, China exported 41,250,000 pounds 20,625 tons of this oil but during the past five years little tung oil could be exported from China because of the war. In the future China will doubtless continue as the foremost producer of tung oil. Even today Chinese scientists are experimenting with new uses for tung oil.

Tung oil first came into prominence in 1914–18 when it was used as a water-resisting varnish in the treatment of airplane fabrics. But as increasing amounts of oil were needed, China was unable to supply the demand. So as early as 1906 efforts were made to grow tung oil trees on plantations in this country and in 1937 the United States produced 175,000,000 pounds 87,000 tons of oil. This amount, however, supplies only about 3 per cent of the American requirements.

The United States Department of Agriculture has encouraged the planting of groves of tung oil trees in our southern states.

It has found the best area to be along the north Gulf Coast, a region with the same latitude as the tung-oil-producing region of China, and with a similar temperature, rainfall, and general climate. Where scientific methods of farming are employed in the United States the amount of fruit that can be grown on one tree may be increased. A small crop of nuts is produced by four-year-old trees and as the tree ages the nut crop increases.

The Chinese apply the oil to furniture, wood structures, masonry, junks and other water craft to make them waterproof. Paper and silk covered with the oil are used for making umbrellas and as window-panes.

In the United States tung oil is used chiefly as an ingredient of water-resistant paint, varnishes, and enamels. In insulating material for electrical apparatus and wiring; waterproofing for raincoats and bath curtains; automatic brake bands, gaskets and fittings for machinery—its quick-drying qualities make it invaluable.

Within the past few months scientists have found means of imparting tung oil properties to various other oils, even to slow-drying and so-called non-drying oil, like castor oil. Then these oils can be used in place of tung oil for waterproofing, so that the diminishing supplies of tung oil now available in this country can be used mainly for paints.

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Note: In Hall 29 there is an example of tung oil fruit and leaves and in Hall 28 there are samples of the seeds and oil.

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FIELD MUSEUM STORIES

Animals in Art

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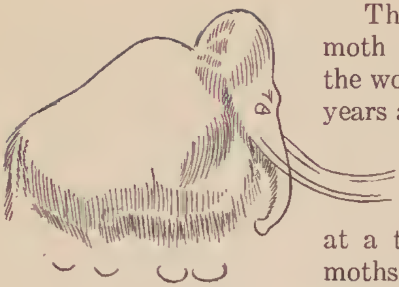
ANIMALS IN ART



Woolly mammoth

This drawing of a woolly little mammoth is one of the earliest pictures in the world. It was made 20,000 or more years ago by some cave-man artist who scratched the picture on an animal bone with a sharpened piece of stone. The artist lived at a time when great herds of mammoths wandered through Europe and Asia, and he and other cave men killed them for food, using stone-headed spears. Probably he thought that if he carved the picture and prayed in front of it, the next day when he went hunting he could kill a mammoth just like the one he had made. If he had luck there would be enough food for his family for many days.

Many primitive people have worshipped animals, believing that they had power to help the people. In Africa, pythons often had special houses built for them and priests to take care of them and make them happy, because it was thought that these snakes could bring rain to make the crops grow.

The ancient Egyptians had cat-goddesses, hawk and crocodile gods, and many others. Cats were sacred to Bastet, the cat-goddess, and bulls to Apis, the bull-god. No one was supposed to kill any of these sacred animals or the gods would be angry. If a holy animal died his body was mummified and buried in a special cemetery. In Egypt scientists have found big cemeteries full of mummified crocodiles, hawks, or cats.

Tiny figures of these animal gods or sacred animals were often worn as good-luck charms. In Egypt they were even buried with dead people so that no evil spirits could hurt the peoples' souls. Long ago in China clay statues of farm animals were buried in the tombs with the dead so that the souls would have horses to ride and chickens to eat when they got to heaven; and in ancient Mexico pottery dogs were buried in graves so that the dog could guide his master's soul, sniffing out the path to heaven.

Some primitive people believe that they are related to animals. The Indians of the Northwest Coast of America are divided into large families or clans, each named after an animal. They say that long ago an ancestor did something to help an animal, and the grateful beast gave that ancestor permission to use his image as a family crest. For instance, a member of the Bear Clan carves the figure of a bear on the front of his boat and wears a bear mask at the dances. He eats out of a wooden bowl made in the shape of a bear and the totem pole which stands in front of his house has a bear carved on it.

Even in ancient Babylonia, about 5,000 years ago, children liked to play with toy animals. They had clay toys in the shape of sheep and horses and hedgehogs, prickly little animals something like porcupines. Some of the animals are on clay wheels and it is easy to imagine how, long ago, some Babylonian baby pulled his little animal along behind him on a piece of string. The Eskimos carved small seals and polar bears and dogteams out of bone as toys for their children.

Figures of animals have been used in writing, in telling time, and for weights. Some of the characters of the ancient Egyptian picture-writing, called hieroglyphics, are little snakes, hawks, and other birds. The Chinese calendar and clock have years and hours named after animals. For instance, to tell the time one might say: "It is the hour of the rabbit" or "the month of the snake." The Romans used weights in the shapes of pigs and goats.

Animal designs have been used in many parts of the world for decorating cloth, dishes, and tools. Some of the designs used by the Chinese people have interesting meanings. For instance, if you should see a pattern of five bats on a bowl or a piece of cloth, they are the "Five Bats of Happiness"—virtue, wealth, long life, a peaceful death, and many children. The dragon, which is a favorite design in China, is thought to be a friendly creature who brings rain to water the crops. The tiger stands for power and he is the king of all the beasts.

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See if you can find some of these animals in Field Museum:

Woolly mammoth: Hall C, Case 8
Carved wooden python from Africa: Hall D, Case 38
Babylonian toy animals and tiny charm in the shape of a ram: Hall K, Cases 3 and 19
Egyptian animal gods, mummies, and animal characters in the picture-writing: Hall J, Cases 6 and 8, 16 and 17, 53
Bear totem pole: Hall 10
Eskimo carved bone toys: Hall 10, Case 36
Mexican pottery dog: Hall 8, Case 1
Chinese clay animals: Hall 24, Cases 9, 16, 19
Calendar animals, dragons, bats of happiness: Hall 30, Case 5

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